

HOBLER, Tadeusz; STREK, Fryderyk

Mixing effectiveness of liquids. Chemia stosow 3 no.2:143-168 '59.

1. Katedra Inzynierii i Konstrukcji Aparatury Chemicznej, Politechnika Slaska, Gliwice.

HOBLEK, Tadeusz; STREK, Fryderyk

Mixing effectiveness of liquids. Chemia stosow 4 no.3/4:307-324  
'60. (EEAI 10:9)

1. Zaklad Inzynierii Chemicznej i Konstrukcji Aparatury PAN Katedra  
Inzynierii Chemicznej Politechniki Szczecinskiej.

(Liquids)

HOBLEK, Tadeusz; STREK, Fryderyk

Mixing effectivity of liquids for Reynolds' numbers complex 160 - 6900.  
Chemia stosow 5 no.2:127-151 '61.

1. Zaklad Inzynierii Chemicznej i Konstrukcji Aparatury, Polska  
Akademia Nauk, Gliwice i Katedra Inzynierii Chemicznej, Politechnika,  
Szczecin.

STREK, Fryderyk

Heat penetration in liquid mixers; research on turbine mixers with six straight spatulas. Chemia stosow 6 no.3:329-368 '62.

1. Zakład Inżynierii Chemicznej i Konstrukcji Aparatury, Polska Akademia Nauk, Gliwice, oraz Katedra Inżynierii Chemicznej, Politechnika, Szczecin.

HOBLER, Tadeusz; STRUK, Fryderyk; ROZEK, Ryszard

Analysis of the relation of the degree of mixing and the amount of power consumed for mixing liquids. Chemia stosow 7 no.3: 273-288 '63.

1. Zaklad Inzynierii Chemicznej i Konstrukcji Aparatury, Polska Akademia Nauk, Gliwice.

STPK, J.

Prefabricated cast asphalt slabs replacing upper layers of wooden floors of bridges. p. 13.

(Drogownictwo, Poland, Vol. 12, no. 1, Jan. 1957.)

SO: Monthly List of East European Accessions (EEAL) LC, Vol. 6, no. 7, July 1957. Uncl.

STREKHINSKAYA, N.N. - aspirant

Treating the photographs of terrestrial stereophotogrammetric  
surveying by the double projection method. Izv. vyz. ucheb.  
zav., geod. i aerof. no.3:101-107 '64. (MIRA 18:3)

1. Universitet druzhby narodov imeni P. Lunnyy.

STREKACHINSKAYA, N.P., aspirant

Making dispositives for a multiplex. Izv. vys. ucheb. zav.; geod. i  
aerof. no.5:83-86 '64. (MIP' 18:5)

1. Universitet druzhby narodov imeni Patrisa Lumumby. Rekomendovana  
kafedroy geodezii.



STREKACHINSKAYA, N.P., aspirant

Double projection in plotting from ground stereophotogrammetric photographs. Izv.vys.ucheb.zav.; geod. i aerof. no.1:131-140 '64.

(MIRA 17:12)

1. Universitet druzhby narodov im. P.Lumumby.

1. Determination of a blasted rock mass and in piles

by surface stereophotographs and a double projector. Izv. vys.  
izuch. zem.; gos. zhur. 8 no.7:63-68 '65. (MIRA 13:9)

2. Determination of a blasted rock mass and in piles  
by surface stereophotographs and a double projector.

STREKACHINSKIY, B.A., inzh.

Study of the operation of a hopper train. Izv.vys. ucheb. zav.;  
gor. zhur. 7 no.3:118-125 '64 (MIRA 17:8)

1. Moskovskiy institut radioelektroniki i gornoy elektrotekhniki.

STREKACHINSKIY, G.A.; GORBACHEV, A.T.; SALMIN, M.Ya.

Computing the capacity of emergency pulp collectors of a block  
in a hydraulic mine. Izv.Sib.otd.AN SSSR no.6:127-130 '61.  
(MIRA 14:6)

1. Kuzbassgiproshakht, Novosibirsk.  
(Hydraulic mining)

STREKACHINSKIY, G.A.; GORBACHEV, A.T.; KORTELEV, O.B.

Problems of roof control in coal mines of the United States. Vop.  
gor. davl. no.17:86-106 '63. (MIRA 18:9)

1. Institut gornogo dela Sibirskogo otdeleniya AN SSSR.

STREKACHINSKIY, G.A.

Costs of development workings in the Kuznetsk Basin. Ugol'  
38 no.6:49-50 Je '63. (MIRA 16:8)

1. Institut gornogo dela Sibirskogo otdeleniya AN SSSR.  
(Kuznetsk Basin—Coal mines and mining--Costs)

STELACHIN, Y. G....: DUKHAYEV, I. I.; KOBACHEN, I. T.

Coal mining with a loader and hydraulic conveying in  
short walls. Trudy Inst. gor. deln. stb. otd. AN SSSR no. 5:  
1963-1964. (MIRA 17:11)

MIRRA HIRSH Y, G.A.

obtaining a type of book reproduction in a hydraulic line field.  
Trudy Inst. gor. dela Sib. otd. AN SSSR no. 5:185-197 '64.  
(MIRA 17:11)



DONTSOV, F.P., student; STREKALEV, A.A., student

Quality of condenser roving, performance and control of the  
condenser. Tekst.prom.22 no.3:49-52 Mr '62. (MIRA 15:3)

1. Vsesoyuznyy zaochnyy institut tekstil'noy i legkoy Promshlennosti.  
(Carding machines)

KUZHEL', A.V.; NAZARENKO, O.K.; POVOD, A.G.; STREKAL', L.P.

Universal electron welding gun with an accelerating voltage up to  
50 kv. Avtom. svar. 15 no.7:88-91 JI '62. (MIRA 15:7)

1. Ordena Turdovogo Krasnogo Znameni institut elektrosvarki imeni  
Ye.O. Patona AN USSR.  
(Electric welding- Equipment and supplies)  
(Electron beams)

S/125/63/000/004/002/011  
D040/D112

AUTHORS: Strekal', L.P., and Nazarenko, O.K.

TITLE: Graphical and analytical plotting of electron trajectories.  
in projectors, and investigation of the magnetic lenses of  
electron welding guns

PERIODICAL: Avtomaticheskaya svarka, no. 4, 1963, 7-11

TEXT: The described graphical and analytical method of plotting  
electron trajectories takes the space charge in the beam into account and  
permits accurate determination of optimum electrode configuration and inter-  
electrode spaces. The fields of a three-electrode gun projector were  
simulated in an electrolytic bath and the magnetic focusing lenses of weld-  
ing guns were investigated. A universal relation for obtaining maximum  
magnetic induction on the lens axis was found. The detailed description is  
illustrated by graphs. There are 5 figures.

ASSOCIATION: Institut elektrosvarki im. Ye.O. Patona AN USSR (Electric  
Welding Institute im. Ye.O. Paton, AS UkrSSR)

SUBMITTED: April 23, 1962

Card 1/1

STREKAL', L.P.; NAZARENKO, O.K.

Graphic analysis of electron paths and the study of magnetic lenses  
of electron welding guns. Avtom. svar. 16 no.4:7-11 Ap '63.  
(MIRA 16:4)

1. Institut elektrosvarki im. Ye.O.Patona AN UkrSSR.  
(Electric welding—Equipment and supplies)(Electron beams)

ACC NO:

AP400/805

SOURCE CODE: 12/186/5/000/024/0050/0050

INVENTOR: Strelak, L. P.; Golko, B. A.; Narynsko, M. B.

ORG: none

TITLE: Method of automatic following the joint in electron beam welding. Class 21, No. 177006

SOURCE: Byulleten' izobreteniy i tovarnykh znakov, no. 14, 1965, 50

TOPIC TAGS: electron beam welding, secondary electron emission, automatic control, electron interaction, metal joining, *electron beam* <sup>equipment</sup> <sub>Y</sub>

ABSTRACT: 1. The method of automatic following of the joint in electron beam welding with the application of an electromagnetic deflection system that shifts the electron beam with regard to the workpiece, is characterized by the fact that in order to eliminate the effect of the material and of the workpiece shape on the tracking accuracy, use is made of the secondary electron emission, occurring during the reaction of the electron beam with the surface of the workpiece, in controlling the deflection system.

2. The method, described in paragraph 1, is characterized by the fact that in order to improve the tracking accuracy, use is made of the secondary electron emission, occurring during the reaction of the auxiliary sharply focused electron beam of low intensity with the surface of the workpiece, in controlling the deflection system.

Card 1/4

UIC: 621.791.72.08

ACC OR 100000000

3. The method, described in paragraphs 1 and 2, is characterized by the fact that in order to simplify the apparatus for shifting the main and auxiliary electron beams use is made of a common electromagnetic deflection system to shift the beams in a lateral direction with respect to the edges of the workpiece.

SUB CODE: 1320/SUBM DATE: 03Nov62/

Card 2/2

L 57482-65 EWT(1) GW

ACCESSION NR: AP5017856

UR/0286/65/000/011/0089/0089  
620.165

AUTHOR: Amaryan, L. S.; Bazin, Ye. T.; Strekalkin, Ye. A.

TITLE: An induction dynamometer for measuring soil stresses. Class 42, No. 171610

SOURCE: Byulleten' izobreteniy i tovarnykh znakov, no. 11, 1965, 89

TOPIC TAGS: electronic measurement, soil mechanics, stress measurement

ABSTRACT: This Author's Certificate introduces: 1. An induction dynamometer for measuring soil stresses. The instrument contains a source of current and a meter. The measurement accuracy is improved and the size of the instrument is reduced by placing the induction pickup in an aneroid case. The pickup is made in the form of flat cylindrical coils wound on a common metal core. 2. A modification of this dynamometer in which provision is made for transmitting plane-parallel deformation. The end surfaces in the aneroid case are made in the form of rigid plates. The induction pickup core is rigidly fastened to one of these plates and the armature which goes into the central aperture of the core is fastened to the other plate.

ASSOCIATION: none

Card 1/3

L 57482-65

ACCESSION NR: AP5017856

SUBMITTED: 03Sep62

ENCL: 01

SUB CODE: EC, ES

NO REF SOV: 000

OTHER: 000

Card 2/3



STREKALOV, A.A.

Simple densitometer for paper electrophoresis. Biul. eksp. biol. i  
med. 54 no. 11:118-121 N '62. (~~1962~~-15:12)

1. Iz laboratorii biokhimii (zav. - kand. biologicheskikh nauk  
A.M. Vitrinskaya) Leningradskogo nauchno-issledovatel'skogo  
instituta tuberkuleza (dir. - prof. A.D. Semenov). Predstavlena  
akademikom V.N. Chernigovskim.

(PAPER ELECTROPHORESIS—EQUIPMENT AND SUPPLIES)

Markov, G.I.

Use of a composite technique in the recognition of images.  
Trudy M.I. no.53:55-78 1964. (NRA 176)

KORNIYENKO, V.S., inzh., laureat Leninskoy premii; ~~STREKALOV, G.M.~~,  
inzh., nauchnyy red.; SKVORTSOVA, I.P., red.izd-va; RYAZANOV,  
P.Ye., tekhn.red.

[Protecting aluminum-alloy construction elements from corrosion]  
Zashchita stroitel'nykh konstrukttsii iz aluminievyykh splavov ot  
korrozii. Moskva, Gos.izd-vo lit-ry po stroit., arkhitekt. i stroit.  
materialam, 1960. 74 p. (MIRA 14:1)  
(Aluminum alloys--Corrosion)

STREKALOV, G.N.

Stand for testing separating vessels. Mashinostroitel' no.3:20 Mr '61.  
(MIRA 14:3)

(Separators (Machines)—Testing)

STREKALOV, G.N.

Machine for cleaning electrode rods. Mashinostroitel' no.6:  
20 Je '61. (MIRA 14:6)  
(Cleaning machinery and appliances)

STREKALOV, G.N.; KOCHKAREV, N.N.

Portable semiautomatic machine for cutting out holes. Mashinostroitel'  
no.7:27 '61. (MIRA 14:7)

(Cutting machines)

STREKALOV, G.N., inzh.

Machine for the removal of coverings from discarded electrodes.  
Svar. proizv. no.8:33-34 Ag '61. (MIRA 14:8)  
(Electrodes)

12300

1573

32545

S/118/62/000/001/002/005  
D221/D301

AUTHORS: Gudimenko, S.S. and Strekalov, G.N., Engineer

TITLE The mechanization and automation of welding at the plants  
of the Moscow Regional Sovnarkhoz

PERIODICAL: Mekhanizatsiya i avtomatizatsiya proizvodstva, no. 1,  
1962, 14-16

TEXT: The Soviet narodnogo khozyaystva (Soviet of the National Economy) of the Moscow economic administrative region has formulated specific tasks for increasing the output of welded structures, including those made by mechanized and automatic methods. The volume during 1959-1965 should be at least the double of 1958, whereas the level of mechanized welding must be increased from 23.5 to 58%. Four new shops for manufacturing electrodes and welding structures, 3 head welding laboratories, 4 automatic lines and 16 complex mechanized sectors were brought into operation. The new processes include automatic and semi-automatic welding with magnetic flux and protective atmosphere, electro-slag welding with

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S/f18/62/000/001/002/005  
D221/D301

The mechanization and ...

robbin electrodes for hydraulic turbine blades, mechanized cutting with the use of acetylene substitutes, resistance welding etc. The change of equipment permitted an increase in the volume of welded structures from 96,000 t in 1958 to 124,000 t in 1960, and those produced by automatic means - from 12,000 t to 38,000 t. The specific volume of blanks used in the Sovnarkhoz went up from 34% in 1950 to 40% in 1960. At Elektrostal'skiy zavod tyazhelego mashinostroyeniye (Elektrostal'sk Heavy Engineering Plant) components weighing 55 t and the frame of XFTV 50 (KhF150) cold rolling mill for tubes (150 t) was also welded. Construction of three model welding plants is organized in cooperation with the Institut elektrosvarki im. Ye.O. Patona (Welding Institute im. Ye. O. Paton). The Podolskiy mashinostroyitel'nyy zavod im. Ordzhonikidze (Podolsk Engineering Plant of Ordzhonikidze) was the first in USSR to introduce automatic welding of collectors for high duty boilers. The Tsentrallyyevoye inzhenerno-konstruktorskoye i tekhnologicheskoye byuro Sovnarkhoza (Central Project, Design and Technological Office of the Sovnarkhoz - TsentrBTB) provided the designs for model welding plants for the

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D221/D301

The mechanization and ...

planned program of 1965. This comprises the complete sets for automatic assembly and welding of spherical bottoms, including the manipulator CM-5000 (SM-5000), and the welding tractor, A<sub>AC</sub>-1000 (ADS-1000). The Kolomenskiy teplostroitel'nyy zavod im. Kuybysheva (Kolomensk Diesel-locomotive works im. Kuybyshev) introduced a model part of a welding plant of cupronickel refrigerators with fully mechanized operations. The operation of the A<sub>CW</sub>-2 (ASSh-2) semi-automatic cutter is facilitated by the use of an air turbine as a drive. The EZTM has worked out the electro-slag welding of turbine blades weighing up to 70 t. The Pavshinskiy mekhanicheskiy zavod (Payshinsk Mechanical Plant) developed semi-automatic welding of the magnetic flux type. Its workers, Liberman, Lakshin and Treshchalin introduced automatic mixing, transport and dosification of the electrode charge. The welding department of TsPKTB worked on unification of the electrodes and reduced the number of their types from 84 to 35. This allowed an increase in their output. The Voskresenskiy khimkombinat (Voskresensk Chemical Plant) is working on introducing plasma cutting, and Dmitrovskiy ekskavatornyy zavod (Dmitrovsk Excavator Factory) on a coating technique under a layer of ceramic fluxes. The Kryukovskiy

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S/118/62/000/001/002/005

D221/D301

The mechanization and ...

ventilyatornyy zavod (Kryukov Ventilator Works) has worked on replacing rivets by welding. A line for carriage manufacture is designed at the Demikhovskiy mashinostroitel'nyy zavod (Demikhovsk Engineering Plant). The authors point out the shortcomings in the development of welding manufacture, particularly the insufficient supply of installation units, carbon dioxide, welding wire, gas shells, hoses, cables etc; and inadequate revision of designs is mentioned. X

Card 4/4

TUNLEY, T.A. SOREANOV, GILL

Welding equipment in England. Baulchold Chem. Inders. Co. Ltd.  
88-92 (2) (MHO 15-1)  
(Great Britain Holding Equipment and supplies)

STILLMAN, G.M.

Japanese export of equipment for the production of  
of plastics. Avtom. avar. 18 no.5:76-78 May '65. (MIRA 15 6)

BYKOV, Mikhail Aleksandrovich; GRATSIANSKIY, Igor' Nikolayevich; KIFER, Isaak Iosifovich; KUTIASHOVA, Yelena Mikhaylovna; LEVIN, Mark Iosifovich; PRYTKOV, Vladimir Tikhonovich; STREKALOV, Ivan Alekseyevich; TALITSKIY, Aleksandr Vasil'yevich; KHARCHENKO, Roman Romanovich; SHUMILOVSKIY, Nikolay Nikolayevich; KASATKIN, A.S., red.; VORONIN, K.P., tekhn.red.

[Course on electric measurements] Kurs elektricheskikh izmerenii.  
Pod red. V.T.Prytkova i A.V.Talitskogo. Moskva, Gos.energ.izd-vo.  
Pt.1. 1960. 479 p. Pt.2. 1960. 430 p. (MIRA 13:10)  
(Electric measurements)

STREKALOV, I. P., inzh.; BOZHKO, F. P., inzh.

Mechanizing cargo handling operations by means of gantry  
cranes. Sudostroenie 28 no.10:44-45 0 '62.

(MIRA 16:1)

(Cargo handling) (Cranes, derricks, etc.)

8(6), 9(2)

AUTHOR:

Strekalov, I.V., Foreman

SOV/SI 59-9-10/33

TITLE:

Sectional Metal Scaffolds for Inspecting 220 kv Air  
Circuit Breakers and Disconnectors

PERIODICAL:

Energetik, 1959, Nr 9, pp 17-19 (USSR)

ABSTRACT:

Measured from the foundations, open air circuit breakers for 220 kv have a height of 8 m, while line disconnectors are 9 m high. This great height is the basic difficulty during the circuit breaker inspection. Until 1958, wooden scaffolds were used for inspecting the VV-220 kv circuit breakers. In 1958, the first sectional all-metal scaffolds were built for inspecting 220 kv circuit breakers. They were composed of gas pipes of 3/4-2" diameter. The author describes in some detail the design of such scaffolds and indicates their load limits. There are 2 sets of diagrams.

Card 1/1



STREKALOV, Petr Mikhaylovich; FREYDMAN, S.M., red.; TRUKHINA, O.N., tekhn.  
red.

[There will be buckwheat] Grechikha budet. Moskva, Izd-vo sel'sk.  
khoz.lit-ry zhurnalov i plakatov, 1961. 30 p. (MIRA 14:12)  
(Buckwheat)

13(7); 25(1)

PHASE I BOOK EXPLOITATION

SOV/3133

Korroziya i zashchita staley; sbornik staley (Corrosion and Protection of Steel: Collection of Articles) Moscow, Mashgiz, 1959. 233 p. 7,000 copies printed.

Ed.: N.D. Tomashov, Doctor of Chemical Sciences, Professor; Reviewers:  
A.A. Zhukhovitskiy, Doctor of Chemical Sciences, Professor, and  
K.S. Ponomareva, Docent; Ed. of Publishing House: Ya.G. Alaverdov; Tech.  
Ed.: S.M. Popova; Managing Ed. for Literature on Machine and Instrument  
Construction: N.V. Pokrovskiy, Engineer.

PURPOSE: This book is intended for scientific and technical personnel concerned with questions of the corrosion and protection of metals.

COVERAGE: The articles in this collection deal with the corrosion of steels in corrosive environments, investigation of the effect of various factors on corrosion, and methods of protecting steels from gas and electrochemical corrosion. Special attention is given to new methods of investigation. A number of the articles give the results of studies made under operating conditions. New data, obtained by the Department of Metal Corrosion,

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Corrosion and Protection of Steel (Cont.)

SOV/3133

Moskovskiy institut stali (Moscow Institute of Steel), are published here for the first time. Four articles are the result of work conducted jointly at the laboratories of the Moskovskiy metallurgicheskiy zavod "Serp i molot" (Moscow Metallurgical Plant "Serp i molot") and the Khimicheskiy zavod imeni M.I. Kalinina (Chemical Plant imeni M.I. Kalinin). Most of the articles contain practical recommendations on the protection of metals from corrosion. No personalities are mentioned. References follow each article.

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Corrosion and Protection of Steel (Cont.)

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Corrosion and Protection of Steel (Cont.)

SOV/3133

Andreyeva, V.G. [Engineer], P.V. Strekalov [Engineer], and M.A. Vedeneyeva.  
Corrosion Resistance of 1Kh18N9T-steel Welded Joints 223

AVAILABLE: Library of Congress

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VK/gmp  
3-11-68

S/19/60/000/011/015/015  
A:61/A030

AUTHORS: Tomashov, N. D., Strekalov, P. V  
TITLE: The corrosion rate of iron-carbon alloys in acids  
PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Chernaya metallurgiya,  
no. 11, 1960. 143 - 28

TEXT: As is known, the corrosion of iron in an acid medium is mainly determined by hydrogen depolarization and depends to a high degree on the number of microcathodes and the value of hydrogen overvoltage on them. Such cathodes are in the first place the cementite with its more positive stationary potential than that of ferrite and graphite. Besides, some slag inclusions also form cathodes as they are positive in respect to a solid iron solution. Detailed data on the behaviour of carbon steel in acids is of practical interest - e.g., for evaluating the corrosion losses of various steels in pickling, for determining the permissible acid concentrations for storage and transportation in ferrous containers, and the like. The purpose of the present work was to obtain numerical data on the behaviour of carbon steel in nitric, sulfuric and hydrochloric acid. ✓

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S/148/60/000/011/015/015  
A161/A03C

The corrosion rate of iron-carbon

Five common carbon steel grades of the "Serp i molot" plant each with a different carbon content (0.025, 0.1, 0.3, 0.45, and 1.0% C) and cast iron with 3.28 % C were studied. The steel was preliminarily annealed at 900°C for 1.5 hour; specimens were tested in a thermostat at 25°C. The test time was from a few minutes in undiluted acid to 40 - 50 hours in weak sulfuric and hydrochloric acid solutions. The results are illustrated in 4 graphs. In nitric acid the corrosion rate rose rapidly with increasing acid concentration and was 1000 - 3000 g/m<sup>2</sup>h at 10 % solution, rose abruptly in the 10 - 30% interval and reached the maximum of 10,000 - 20,000 g/m<sup>2</sup>h at 30 %. The increased activity of hydrogen ions (i.e., hydrogen depolarization) and reduction of anions are the causes of the higher corrosion rate in nitric acid compared with sulfuric or hydrochloric. An increase of the C content speeded up the corrosion in nitric acid only up to a certain limit, from which the corrosion rate decreased (Figure 1), which is explained by passivation through accumulation of active cathode components on the surface (carbides, graphite, slag inclusions). Analogous correlations were found in sulfuric acid (Figure 2), but the corrosion rate was lower and more smooth in variation. The mechanism is apparently not identical with

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The corrosion rate of iron-carbon ....

S/148/60/000/0:1/0:5/0:5  
A161/A030

the process in nitric acid, for it is probable that the formation of sulfate or sulfide films increases protection. In hydrochloric acid the solubility of metal is slow at a low concentration, then speeds up abruptly (Figure 3) and is determined by the speed of hydrogen ions discharged. Increasing C content speeds up corrosion. The data of practical importance for the quantitative correlation of the corrosion rate  $K$  of steel and the hydrogen ions activity  $a$  for each of the three acids were determined (Figure 4). The relation is expressed by straight lines, and their parallel trend shows that the dissolving of steel follows the same law, and the constant  $n$  (tangent of the straight lines incline angle) does not depend on the C content in alloys. The analytical dependence of the dissolving rate of carbon steel fits the formula usually employed in literature (Ref. 4: S. A. Balezin, T. A. Krasovitskaya, Zhurnal prikladnoy khimii, 1951, no. 24, 127):

$$K = k \cdot a^n$$

( $K$  - metal dissolving rate,  $a$  - acid activity,  $k$  and  $n$  - constants). The constant  $k$  presents the corrosion rate of metal at acid activity equal a unit; the constant  $n$  is determined by the nature of the acid. According Card 3/5

The corrosion rate of iron-carbon ...

S/148/60/000/011/015/015  
A161/A030

to data obtained in these experiments,  $n$  is 0.875 for nitric acid, 0.90 for hydrochloric, and 0.33 for sulfuric acid. Knowing the empirical  $k$  constant (that depends on the nature of the acid and the composition of the alloy and is determined by the lengths cut off by the straight  $\lg K - \lg a$  lines from the ordinate) and the determined  $n$  constant values, the corrosion losses may be roughly calculated for carbon steel in non oxidizing acids. In the case of oxidizing acids this will only be possible for acid concentrations up to the maximum on the curves (Figure 2 and 4), i.e., as long as the corrosion rate increase is still exponential. There are 4 figures and 4 references: 3 Soviet and 1 non-Soviet. ✓

ASSOCIATION: Moskovskiy institut stali (Moscow Steel Institute)

SUBMITTED: February 11, 1960

Card 4/8

18.8300

33838

S/137/62/000/001/180/237

A006/A101

AUTHORS: Tomashov, N. D., Strekalov, P. V.

TITLE: Investigating the corrosion rate of ferro-carbon alloys in acids at elevated temperatures

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 1, 1962, 80 - 81, abstract 11569. ("Korroziya i zashchita konstrukts. metallich. materialov", Moscow, Mashgiz, 1961, 196 - 199)

TEXT: Increased temperature of acid causes a sharp increase of the corrosion rate of Fe-C alloys; the corrosion rate increases also at a higher C content in the alloy in non-oxidizing acids, and in oxidizing acids it decreases due to the partial inhibition of the anodic process. The effect of temperature on the diffusion rate of carbon steels in HCl, HNO<sub>3</sub> and H<sub>2</sub>SO<sub>4</sub>, can be described by the exponential equation  $K = A \exp(-E/RT)$ . The authors determined the activation energy of processes of carbon-steel diffusion in HNO<sub>3</sub>, H<sub>2</sub>SO<sub>4</sub> and HCl. For HNO<sub>3</sub> the activation energy is equal to 10.5 kcal, for H<sub>2</sub>SO<sub>4</sub> and HCl it is 13.5 and 17.35 kcal, respectively.

[Abstracter's notes: Complete translation]

Author's summary

Card 1/1

ACCESSION NR: AT4013988

S/3070/63/000/000/0193/0195

AUTHOR: Golubev, A. I.; Strekalov, P.V.

TITLE: Semiautomatic installation for measurement of potential on the surface of alloy microcomponents

SOURCE: Novy\*ye mashiny\*i pribory\* dlya ispy\*taniya metallov. Sbornik statey. Moscow, Metallurgizdat, 1963, 193-195

TOPIC TAGS: alloy surface, potential distribution, surface potential measurement, microgalvanic couple, corrosion, aluminum alloy, aluminum corrosion, nickel aluminum alloy, nickel alloy

ABSTRACT: The corrosion rate of alloys frequently depends on the presence and effectiveness of microgalvanic couples on the metal surface. An installation has been constructed by the authors which is capable of determining and recording potential differences between alloy-structure components several decades of microns large, with a precision up to fractions of a millivolt. The installation is illustrated in Fig. 1 of the Enclosure. Electrogalvanic

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ACCESSION NR: AT4013988

potentials between the structure components of an alloy are measured, using the compensation method, by a cathode voltmeter having an input resistance of approximately 150 megohms and provided with a high-resistance potentiometer PPTV-1. The cathode voltmeter represents a simple electrometric amplifier, fed from a battery. The test specimen, having a smoothly ground surface, is mounted in a bath filled with electrolyte, underneath a microscope on a micromanipulation table, permitting observation of a desired region on the specimen surface. A capillary is fastened to a micromanipulation column and is filled with electrolyte. The tip of this capillary can be located at a close distance over the spot investigated on the surface of the specimen. For electrochemical measurements, the internal diameter of the capillary must be several times smaller than the dimension across the crystallite investigated. At its other end the capillary is enlarged and is connected to a calomel half-cell. The body of the specimen is connected to the negative pole of the input side of the cathode voltmeter by an insulated conductor. The positive pole of the cathode voltmeter input side is connected to the negative pole of the potentiometer PPTV-1, the positive pole of which is connected to the calomel half-cell, closing the galvanic chain. The high-resistance potentiometer, together with the cathode voltmeter, permits compensating the

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ACCESSION NR: AT4013988

major part of the potential difference between the calomel half-cell and the metallic electrode on the specimen surface. The remaining smaller part of the potential difference is amplified in the cathode voltmeter and can be measured on its output side by a microammeter or galvanometer with a luminescent scale. When used together with the microammeter M-95, the obtainable sensitivity of the cathode voltmeter is from 100 mV to 0.2 mV per division. The potential of each investigated point of the specimen is determined by reading the decades off the potentiometer, and the units on the scale of the microammeter. A photographic device is focused on the luminescent scale of the microammeter and records the uncompensated potential changes on the surface of the specimen, while the specimen is moved horizontally underneath the stationary capillary tip by operating, at certain intervals, a selsyn coupled to the micromanipulation table. At the same time, the selsyn actuates a drive in the photographic recorder, causing a movement of the recording roll-film, synchronous with the horizontal dislocation of the specimen underneath the capillary tip. For example, Fig. 2 of the Enclosure shows curves of potential distribution of the surface of a specimen of aluminum-base alloy with 8% nickel in 0.1N NaOH at room temperature, obtained with the above described installation. The structure of the alloy consisted of the eutectic  $\text{Al}+\text{NiAl}_3$ .

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ACCESSION NR: AT4013988

Different size crystals of the intermetallic  $\text{NiAl}_3$  were scattered on the background of the eutectic. In the investigated alloy, the intermetallic phase represents the cathode, and a potential difference of 12 mV has been measured between the anodic background and the intermetallic phase. It has been found that this potential difference decreased with time (see Fig. 2 of the Enclosure). Orig. art. has: 3 figures.

ASSOCIATION: Institut fizicheskoy khimii AN SSSR (Institute of Physical Chemistry, AN SSSR)

SUBMITTED: 00

DATE ACQ: 20Feb64

ENCL: 02

SUB CODE: MM

NO REF SOV: 000

OTHER: 000

Card 4/8

STREKALOV, P.V.

Device for preparing samples for corrosion tests. Zav.lab. 29 no.2:  
239 '63. (MIRA 16:5)

1. Moskovskiy institut stali i splavov.  
(Metals--Corrosion)



L 28530-66 EWI(m)/EWP(t)/ETI IJP(c) JD/WB/GD

ACC NR: AT6013802

(N)

SOURCE CODE: UR/0000/65/000/000/0264/0278

AUTHOR: Strekalov, P. V.; Berukshtis, G. K.

57  
B+1

ORG: none

TITLE: Atmospheric corrosion of zinc and cadmium coatings on steel and the coefficients of conversion from the findings of accelerated tests to operating conditions

SOURCE: Korroziya metallov i splavov (Corrosion of metals and alloys), no. 2. Moscow, Izd-vo Metallurgiya, 1965, 264-278

TOPIC TAGS: corrosion, zinc, cadmium, metal coating, atmospheric contamination, regional study, test method

ABSTRACT: Natural tests of galvanic Zn and Cd coatings performed over the 1950-1963 period in various climatic regions of the USSR under the auspices of the Institute of Physical Chemistry AS USSR showed that their corrosion rate differs depending on the geographic zone: in the Northern and Central USSR, with their prevailing cold weather, this rate averages 0.4-0.8  $\mu$ /year for Zn coatings and 0.6-0.8  $\mu$ /year for Cd coatings, whereas in the atmosphere of the humid subtropics (southern Black Sea coast) it averages 1.2  $\mu$ /year for Zn coatings and 2.5-3  $\mu$ /year for Cd. coatings. In the industrial districts, with their polluted atmosphere, this rate is 4 and 10  $\mu$ /year for Zn and Cd coatings, respectively. In this connection, accelerated tests of Zn and

Card 1/2

L 28530-66

ACC NR: AT6013802

Cd coatings were carried out in three chambers: a "heat and moisture" chamber simulating the conditions of the clean atmosphere in the humid tropics; a "sulfur dioxide" chamber simulating the atmosphere over industrial districts; and a "sea mist" chamber simulating the atmosphere of the Baltic Maritime Region. In each chamber the specimens were subjected to cyclic changes in temperature and humidity; in the "sea mist" chamber, moreover, sea mist was simulated by spraying an aerosol with the composition: NaCl 27 g/liter, anhydrous  $MgCl_2$  6 g/liter, anhydrous  $CaCl_2$  1 g/liter, and KCl 1 g/liter. The acceleration of corrosion processes in the chamber was chiefly accomplished by increasing the concentration of active corrosive impurities in the film of moisture wetting the metal surface. It is shown that the relevant conversion coefficient can be estimated from the relation:

$$\frac{\Delta K}{\Delta \tau}, \text{ g/(m}^2\text{-year)} \text{ under natural conditions: } \frac{\Delta K}{\Delta \tau}, \text{ g/(m}^2\text{-year)} \text{ in accelerated-}$$

-test chambers, where K is the corrosion rate. A comparison of the findings of natural and accelerated (chamber) tests showed that tests in "sea mist" and "heat and moisture" chambers were qualitatively sufficiently representative of the natural conditions of corrosion, whereas tests in the "sulfur dioxide" chamber were too rigorous and inadequately reflected the corrosion behavior of the coatings in natural industrial atmosphere; this can be remedied by introducing the two chief aggressors,  $Cl^-$  and  $SO_2$  in more realistic ratios. Orig. art. has: 3 figures, 5 tables.

SUB CODE: 11119720/ SUBM DATE: 19Jul65/ ORIG REF: 002

Card 2/2 CC

STREKALOV, S., inzh.-podpolkovnik zapasa.

The possibility of operating engines with a lowered oil pressure.  
Tankist no.4:40-43 Ap '58. (MIRA 11:5)

(Gas and oil engines)

KITAYGORODSKIY, S.A.; ~~STREKALOV, S.S.~~

Method of calculating the depth of the layer of transitional  
temperature in the sea by hydrological observation data. Vest.  
Mosk.un.Ser.biol.,pochv.,geol.,geog. 11 no.2:213-220 '56.  
(MIRA 10:10)

1. Kafedra okeanologii.  
(Ocean temperature)

STREKALOV, S.S.

Determining the analytical form of the energy spectrum of developed waves. Okeanologiya 1 no.3:439-442 '61. (MIRA 16:11)

1. Morskoy gidrofizicheskiy institut AN SSSR.

ABUZYAROV, Yu.N.[translator]; MATUSHEVSKIY, G.V.[translator];  
STREKALOV, S.S.[translator]; KRYLOV, Yu.M., red.;  
VERES, L.F., red.; DOTSENKO, V.A., tekhn. red.

[Wind waves]Vetrovye volny. Moskva, Izd-vo inostr. lit-ry,  
1962. 441 p. Translated from the English. (MIRA 15:11)  
(Waves)

STREKALOV, S.S.; KUZ'MIN, V.I.

Empirical spectra of wind waves. Okeanologiya 2 no.1:67-71 '62.  
(MIRA 15:2)

1. Morskoy gidrofizicheskiy institut AN USSR.  
(Waves)

BROVIKOV, I.S.; STREKALOV, S.S.; KUZ'MIN, V.I.

Theoretical concept of the energy spectrum of wind waves.  
Okeanologiya 2 no.5:822-834 '62. (MIRA 15:11)

1. Morskoy gidrofizicheskiy institut AN USSR.  
(Waves--Spectra)



KITAYGORODSKIY, S.A.; STREKALOV, S.S.

Analysis of the spectra of wind waves. Part 1. Izv. AN SSSR. Ser.  
geofiz. no.9:1221-1228 S '62. (MIRA 15:8)

1. Institut okeanologii AN SSSR. (Waves)

STREKALOV, S.S.

2

KITAYGORODSKIY, S.A., AND STREKALOV, S.S., AND KARAPETIAN, K.I.

Universal relations between parameters of the turbulent air flow  
above the sea and the energy spectrum of windwaves.

Report to be submitted for the 13th General Assembly, INTL. Union of  
Geodesy and Geophysics (IUGG), Berkeley, Calif., 19-31 Aug 63

KITAYGORODSKIY, S.A.; STREKALOV, S.S.

Analysis of the spectra of wind waves. Part 2. Izv. AN SSSR.  
Ser. geofiz. no.8:1240-1250 Ag '63. (MIRA 16:9)

1. Institut okeanologii AN SSSR, i Morskoy gidrofizicheskiy institut.  
Predstavleno chlenom redaktsionnoy kollegii Izvestiy AN SSSR, Ser'ya  
geofizicheskaya, S.V.Dobroklonskim.  
(Waves)

MATUSHEVSKIY, G.V.; STREKALOV, S.S.

Calculation of the two-dimensional energy spectrum based on  
data obtained from stereophotographic surveying of waves.  
Okeanologiya 3 no.5:840-847 '63. (MIRA 16:11)

1. Gosudarstvennyy okeanograficheskiy institut.

WILLIAM S. WILKINSON

Some of the results of the research in Sub-section 1.0 are  
presented in the following table. The data are presented in the  
table.

10. Warrant of Arrest - Issued by the court on the basis of a complaint or indictment.

KRYLOV, Yu.M.; STREKALOV, S.S.; TSYPLUKHIN, V.F.

Study of the frequency power spectrum and heights of wind waves in  
the coastal zone. Izv. AN SSSR. Fiz. atm. i okeana 1 no.10:1065-  
1078 0 '65. (MIRA 18:10)

L 07217-07 E.T.(1) CW

ACC NR: AP6024429

(N)

SOURCE CODE: UR/0362/66/002/007/0729/0739

AUTHOR: Krylov, Yu. M.; Strekalov, S. S.; Tsyplukhin, V. F.

ORG: none

TITLE: Investigation of the angular energy spectrum of wind waves<sup>12</sup>

SOURCE: AN SSSR. Izvestiya. Fizika atmosfery i okeana, v. 2, no. 7, 1966, 729-739

TOPIC TAGS: wave propagation, fluid flow, hydrodynamics, ocean current

ABSTRACT: The authors examine the angular spectrum of wind waves of the deep sea and its changes in the coastal zone. The spectral method permits eliciting the physical essence of the principal qualitative and quantitative changes which a wave field undergoes in a narrow coastal shallow-water zone up to the surf belt and close to the shore in deep water. The essence of this method is that the complex wave motion which is observed under natural conditions is replaced by an aggregate of elementary two-dimensional waves with different amplitudes, lengths, directions, and random phases where each elementary wave obeys laws of classical hydrodynamics. A linear spectral model is used in which the complex motion is formed by simple summation of elementary harmonics. The distribution of energy between the elementary waves (spectral components) is characterized by the energy spectrum. Information on the distribution of wave energy as a function of direction of propagation ( $\theta$ ) gives the angular spectrum  $e_2(\theta)$

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UDC: 551.466.4

L 07217-67

ACC NR: AP6024429

which plays a decisive role in the formation of wave height under complex conditions of the coastal zone. The experimental data on the structure of the angular spectrum of wind-generated waves of the deep sea confirm the previously deduced hypothetical dependence  $\cos^2 \theta$ . Transformation of the angular spectrum in a narrow coastal zone up to the moment of breaking obeys the same regularities which were previously detected for the frequency spectrum, viz., each component of the angular spectrum changes according to the laws of the linear hydrodynamic theory without noticeable energy losses. This conclusion follows from a comparison of measurements under natural conditions with the results of theoretical calculations. Orig. art. has: 12 formulas, 2 tables, and 5 figures.

SUB CODE: 08,20/ SUBM DATE: 07Feb65/ ORIG REF: 008/ OTH REF: 006

Card 2/2 *tel*



ACC NR: AT6028804

SOURCE CODE: UR/3222/65/000/008/0032/0058

AUTHOR: Krylov, Yu. M. (Doctor of physico-mathematical sciences); Strekalov, S. .  
(Candidate of physico-mathematical sciences); Tsyplyukhin, V. P. (Junior research  
associate)

ORG: none

TITLE: Energy spectrum transformation of wind generated sea waves in coastal zones

SOURCE: Moscow. Gosudarstvennyy proyektno-konstruktorskiy i nauchno-issledovatel'-  
skiy institut morskogo transporta. Trudy, no. 8(14), 1965. Volnovyya issledovaniya;  
inzhenernyye izyskaniya (Wave Studies; engineering research), 32-58

TOPIC TAGS: ocean <sup>tide</sup> ~~wave~~, spectrum analysis, ocean dynamics

ABSTRACT: An equation for sea waves is found for any shape of the bottom in coastal  
areas. The simple case of monochromatic waves propagating toward the coast is solved  
first. The complex nature of a turbulent sea surface is considered next as the first  
step toward a more realistic solution. The surface is represented (at large distances  
from the coast) as the sum of a large number of plane waves having different ampli-  
tudes, frequencies, directions of propagation, and having random phases uniformly dis-  
tributed in the interval from 0 to  $2\pi$ . The calculated results were compared with ex-  
perimental data obtained from measurements made in coastal areas of the Black Sea  
during 1960-1962. Reduction of wave amplitudes in coastal areas having rectilinear  
coast lines begins in deep-water areas at considerable distance from the coast.

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ACC NR: AT6028804

Average height of waves in the narrow coastal zone with inclinations of 0.1 to 0.01 .  
at the beginning decreases and then begins to grow intensely up to the moment when the  
waves break down. Measured frequency spectra are compared with the calculated;  
transformation of frequency spectrum in the narrow coastal zone with isobaths occurs  
in accordance with linear theory up to the instant of wave break down. Orig. art.  
has: 3 formulas, 7 tables, and 11 figures.

SUB CODE: 08/ SUBM DATE: none/ ORIG REF: 027/ OTH REF: 006

Card 2/2

ACC NR: AT6028808

(N) SOURCE CODE: UR/3222/65/000/008/0100/0103

AUTHOR: Strekalov, S. S. (Candidate of physico-mathematical sciences); Goncharov, Ye. I. (Junior research associate)

ORG: none

TITLE: Evaluation of accuracy in calculations of sea waveheight by considering different numbers of spectral components

SOURCE: Moscow. Gosudarstvennyy proyektno-konstruktorskiy i nauchno-issledovatel'skiy institut morskogo transporta. Trudy, no. 8(14), 1965. Volnovyye issledovaniya; inzhenernyye izyskaniya (Wave studies; engineering research), 100-103

TOPIC TAGS: ocean wave, spectrum analysis, ocean dynamics

ABSTRACT: The problem of selecting an optimum number of spectral components for calculating average heights of sea waves is solved on the basis of a simple mathematical model. The error resulting from the selection of a given number of components is found. The selected mathematical model is a theoretical solution for the spectrum of refracted waves in a coastal zone with rectilinear isobaths. It is found that the minimum number of directional spectrum components, for the simplest case, that have to be considered is three in order that the error does not exceed 10%.

Orig. art. has: 2 figures.

SUB CODE: 08/ SUBM DATE: none/ ORIG REF: 002

Card 1/1



STREKALOVA, I.I.

Observations on the spawning of pink salmon (*Oncorhynchus gorbusha* (Walbaum)) and summer-spawning chum (*Oncorhynchus keta* (Walbaum)) in the My River (the bayon of the Amur River). Vop. ikht. 3 no.2: 256-265 '63. (MIRA 16:7)

1. Kafedra ikhtiologii i zoologicheskoy muzey Moskovskogo universiteta.  
(My River--Pink salmon) (My River--Chum salmon)

STREKALOVA, I.M.

Characteristics of the orthopedic treatment of patients with  
parodontosis. Trudy ISGMI 63:62-70 '60. (MIA 15:1)  
(GUMS...DISEASES)

STREKALOVA, I.M.

Use of various designs of artificial masticatory teeth in removable  
protheses (plastic materials porcelain, "Sazur"). Trudy LSGMI 63:  
153-159 '60. (M.A 15:1)

(TEETH, ARTIFICIAL)

STREKALOVA, N.V.

The next tasks in obstetric aid. Zdrav.Bel. no.3:3-6 '62.

(MIRA 15:5)

1. Glavnyy akusher-ginekolog Ministerstva zdravookhraneniya BSSR.  
(OBSTETRICS)



STREKALOVA, N.V.

Improving medical service for women. Zdrav. Bel. 9 no. 789-11  
Jl'63 (MIRA 1784)

1. Glavnyy akusher-ginekolog Ministerstva zdravookhraneniya  
RSFSR.

STREKALOVA, O. S.

STREKALOVA, O. S.: "An amperometric method of analyzing highly coercive magnetic alloys." Min Higher Education USSR. Kazan' Order of Labor Red Banner State U imeni V. I. Ul'yanov Lenin. Kazan'. 1956. (Dissertation for the Degree of Candidate in Chemical Science)

Source: Knizhnaya Letopis' No. 28 1956 Moscow

32-2-5/60

AUTHORS: Toropova, V. F. - Strelalova, O. S.

TITLE: The Amperometric Determination of Cobalt in Magnetic Alloys  
(Amperometricheskoye opredeleniye Kobal'ta v magnitnykh splavakh)

PERIODICAL: Zavodskaya Laboratoriya. 1958. Vol. 24. Nr 2, pp. 140-141  
(USSR)

ABSTRACT: As basis of the above mentioned method the oxidation of bivalent cobalt with potassium-ferric-cyanide, in ammoniacal medium, was taken. The apparatus is arranged as usual (rotating Pt-cathode, calomel-anode, micro-amperometer etc.) and the titration was carried out at -0,2 V. The authors found that a back-titration of potassium-ferric-cyanide shows better results than the direct titration (i.e. Co-ions with K-ferric-cyanide) and that it is essentially necessary to add a certain amount of K-ferric-cyanide solution to the solution to be investigated before titration (which then is back-titrated). With this method described the presence of nickel, aluminum and iron does not disturb, while copper must earlier be removed with hydrogen sulfide, Na-thiosulfate or by electrolysis. From the course

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The Amperometric Determination of Cobalt in Magnetic Alloys 32-2-5/60

of analysis mentioned can be seen that the sample was dissolved in nitric acid and that the copper was precipitated with Na-thiosulfate and then was titrated with 0,1 M potassium-ferric-cyanide solution. The end point was determined graphically. The method described is used in series analyses in the laboratories of the Institute. The duration of analysis is mentioned to be 20 - 30 minutes. From a comparison by means of tables of the results obtained gravimetrically and those obtained according to this described method a satisfactory coincidence is shown. There is 1 table.

AVAILABLE: Library of Congress

1. Cobalt-Determination
2. Potassium ferric cyanide-Applications
3. Titration

Card 2, 2

1. STREKALOVSKIY, F. P.
2. USSR (600)
4. Cabbage
7. Ripening cabbage in winter. Sad i og. no. 10, 1952

9. Monthly List of Russian Accessions, Library of Congress, January 1953. Unclassified.

S/020/60/134/006/022/031  
B004/B054

AUTHORS: Vlasov, V G. and Strekalovskiy, V N  
TITLE: Interaction Between Hydrogen and Uranium Trioxide  
PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 134, No. 6.  
pp. 1384-1386

TEXT: The authors give a report on their investigation of the reduction of uranium trioxide by hydrogen in the temperature range from 300 to 500°C and at a hydrogen pressure of 50 - 400 torr. The experiments were made in a vacuum apparatus, and the loss in weight of  $UO_3$  was measured by a spring balance. The experimental data are shown in diagrams; Fig. 1: degree of reduction as a function of time at different temperatures and  $P_{H_2} = 200$  torr; Fig. 2: degree of reduction as a function of time at different  $P_{H_2}$  and 400°C; Fig. 3: reaction rate as a function of the degree of reduction at different temperatures; and Fig. 4: reaction rate as a function of the degree of reduction at different  $P_{H_2}$ . Table 1 shows the

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Interaction Between Hydrogen and Uranium  
Trioxide

S/020/60/134/006/022/03'  
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ratio O : U for  $P_{H_2} = 200$  torr after two hours of heating to  $350^\circ$ ,  $400^\circ$ ,  $450^\circ$ , and  $500^\circ$ . These results are interpreted on the basis of the phase diagram of the U - O system. The first horizontal sections of the curves in Figs. 3 and 4 correspond to the reduction of  $UO_3$  to  $U_3O_8$ . Here, the limiting stage is the reaction of hydrogen adsorbed on the oxide surface with the oxygen of the oxide. This reaction follows equation (1):

$V = kP_{H_2}^{1/2}$ . The hydrogen is rapidly adsorbed in the atomic state. As the authors had proved in a previous paper (Ref. 1) that  $UO_3$  dissociates in

vacuo only above  $430^\circ$ C, while reduction starts already at  $350^\circ$ C, the latter proceeds without previous dissociation. The curve sections in which the reaction rate decreases with increasing degree of reduction correspond to the continuous transition of  $U_3O_8$  into the phase  $UO_{2.6+x}$  with the minimum oxygen content corresponding to the given temperature. The decrease in the reaction rate is explained by a reduction of the oxygen content in the solid phase. The second horizontal sections of the curves in Figs. 3

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Interaction Between Hydrogen and Uranium  
Trioxide

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B004/B054

and 4 correspond to the reduction of  $UO_{2.6+x}$  to the tetragonal phase. Here, the limiting stage is the hydrogen adsorption on the oxide surface according to equation (2):  $V = k_1 P_{H_2}$ . No reduction to  $UO_{2.0}$  occurred in the temperature range investigated. The authors mention a paper by F. F. Vol'kenshteyn (Ref. 3). There are 4 figures, 1 table, and 4 references: 3 Soviet and 1 Swedish.

ASSOCIATION: Ural'skiy politekhnicheskiy institut im. S. M. Kirova  
(Ural Polytechnic Institute imeni S. M. Kirov)

PRESENTED: June 11, 1960, by V. I. Spitsyn, Academician

SUBMITTED: June 8, 1960

Card 3/3



21220

5/126/61/011/003/007/017  
E193/E483

26.2230

AUTHORS: Strekalovskiy, V.N., Bessonov, A.F., Vlasov V.G. and  
Sidorenko, F.A.

TITLE: Phase Transformations During Reduction and Oxydation  
of Uranium Oxides

PERIODICAL: Fizika metallov i metallovedeniye, 1961, Vol.11, No.3,  
pp.400-403 + 1 plate

TEXT: The uranium-oxygen system has lately attracted a great  
deal of attention owing to the possibility of using uranium  
oxides (dioxide in particular) in the manufacture of ceramic fuel  
elements. However, the experimental work has been mainly  
confined to studies of oxydation or thermal decomposition of  
uranium oxides, and the object of the present investigation was to  
study (a) the kinetics of hydrogen reduction of amorphous  $UO_3$   
and green  $U_3O_8$  at 300 to 700°C, (b) the process of oxydation of  
 $UO_2$  in air, oxygen and  $CO_2$  at 165 to 860°C and (c) the phase  
transformations taking place during these reactions. The results  
of the study of kinetics of the reduction process are reproduced  
schematically in Fig.1, where the rate of reduction (A in  
arbitrary units) is plotted against the overall composition of the  
Card 1/5

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Phase Transformations ...

S/126/61/011/003/007/017  
E193/E483

X

resultant product, i.e. against the oxygen/uranium (O/U) ratio. It is pointed out, in this connection, that neither the rates of reduction of  $UO_3$  and  $UO_8$ , nor the energy barriers during the crystallo-chemical transformations of these oxides are the same; thus, for instance, hydrogen reduction of  $UO_3$  begins at  $350^\circ C$ , the corresponding temperature for  $UO_8$  being  $450^\circ C$ . In addition, reduction of  $UO_3$  at temperatures  $\leq 500^\circ C$  practically ceases when the oxide reaches the oxide content corresponding to  $UO_{2.33}$ ; at higher temperatures,  $U_4O_9$  and oxides with a still lower oxygen content are produced. The results of the kinetic studies were correlated with the results of X-ray diffraction analysis of the products of the reduction of  $U_3O_8$ , and the following conclusions were reached regarding the phase transformations, taking place during the reduction process. In the initial stages,  $U_3O_8$  gradually loses its oxygen, this process continuing until the starting material is reduced to 46.9% (100% reduction corresponding to complete conversion of  $UO_3$  to  $UO_2$ ) which corresponds to the overall composition of the product given by the formula  $UO_{2.539}$ ; at this stage, the X-ray diffraction pattern still shows the

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lines of the  $U_3O_8$  phase; the lattice parameters of the initial phase have changed but no lines of a new phase have yet appeared; at 62 and 69% reduction, the lines of the starting oxide are still present in the X-ray pattern and lines of the cubic  $U_4O_7$  phase appear; at 75% reduction, the  $U_3O_8$  lines completely disappear and only the  $U_4O_7$  lines remain; after a further decrease in the oxygen content, the crystal structure of the oxide remains cubic but the lattice parameter increases. Reduction of  $UO_3$  takes place in a similar manner, the crystalline  $U_3O_8$  phase being formed directly from the amorphous  $UO_3$  which does not pass through the crystalline form during this process. The whole reduction process can be represented in the following manner.

Amorphous  $UO_3 \rightarrow$  Solid solution, based on  $UO_{2.67} \rightarrow UO_{2.2} \rightarrow UO_2 + x$ . Regarding the process of oxydation of  $UO_2$  in air or in oxygen, it can be represented by

$UO_2 \rightarrow UO_2 + x \rightarrow UO_{2.36} + 0.05 \rightarrow$  Solid solution, based on  $UO_{2.67}$ .

The tetragonal phases ( $UO_{2.32} + 0.01$ ,  $UO_{2.35}$ ,  $UO_{2.37}$ ,  $UO_{2.41}$ )

whose presence can be inferred from the kinetics of the process studied, are unstable and decompose to form  $U_4O_9$  and  $U_3O_8$ . When  
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the oxydation reaction takes place (in air or oxygen) at temperatures  $\geq 400^{\circ}\text{C}$ , no formation of the tetragonal phases occurs, and the process proceeds according to. X

$\text{UO}_2 \rightarrow \text{UO}_2 + x \rightarrow \text{UO}_{2.25} \rightarrow \text{Solid solution, based on UO}_{2.67}$ .

Finally, it was established that  $\text{UO}_2$  does not oxidize in carbon dioxide. There are 3 figures and 12 references: 8 Soviet and 4 non-Soviet.

ASSOCIATION: Ural'skiy politekhnicheskiy institut im. S.M.Kirova  
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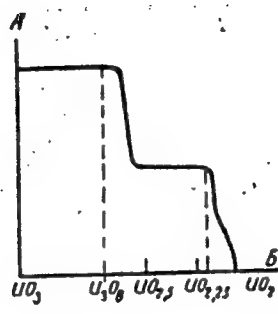
SUBMITTED: July 18, 1960

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Fig.1.



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AUTHORS: Strekalovskiy, V.N., Vlasov, V.G.

TITLE: Kinetics of Reduction of Uranium Trioxide by Hydrogen

PERIODICAL: Zhurnal Prikladnoy Khimii, 1961, Vol. 34, No. 1, pp. 32-38

TEXT: The purpose of the present investigation was to extend the knowledge of the mechanism of indirect reduction of metal oxides, in particular of the kinetics and mechanism of uranium trioxide reduction with hydrogen gas. Since indirect reduction of  $UO_3$  is thermodynamically possible until  $UO_2$  only, the part between  $UO_3$  and  $UO_2$  of the uranium - oxygen phase diagram was of interest. Reduction of  $UO_3$  to  $UO_2$  is important for uranium production [Ref.1, G.A. Meyerson, Atomnaya Energiya, 7,2 129 (1959)], but literature contains only information on the preparation of  $UO_2$  with particular properties [Ref.2, D. Katz, E. Rabinowitch, Chemistry of Uranium, N.N.E.S.; Ref.3, G. Seaborg, D. Katz, The Actinides, N.N.E.S.; Ref.4, D. Vaughan, I. Briedge, A. Allison, C. Shvartz, Ind.Eng.Chem., 49,10,1699-1700 (1958); Ref.7, I. Maly, H. Landpersky, Iaderna Energie, 4,1,9-18 (1958)] and no data are given on the whole

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# Kinetics of Reduction of Uranium Trioxide by Hydrogen

mechanism and kinetics of this process. In the present paper experimental results on the reduction of  $UO_3$  by hydrogen at temperatures of  $350^{\circ}C$ - $500^{\circ}C$  and hydrogen pressures of 50-400 torr are given. The used amorphous  $UO_3$  powder was prepared by heating  $UO_4 \cdot nH_2O$  in an oxygen stream at  $350^{\circ}C$  during 5 hrs with final heating at  $400^{\circ}C$  for 1 hr. The investigations were carried out in a high-vacuum circulation apparatus with a tungsten spring balance. Hydrogen was circulating through the system continuously, while temperature was regulated by an electronic  $\Theta \Pi \Theta -01$  (EPV-01) thermoregulator and controlled by a  $\Pi \Pi$  (PP) bridge. From the experimental data "reduction degree versus time" curves were plotted (Fig.2-3). Two series of experiments were made: one at temperatures from  $300^{\circ}C$ - $500^{\circ}C$  and a hydrogen pressure of 200 torr, the other at  $400^{\circ}C$  and pressures from 50 to 400 torr. The dependence of the reduction rate on the reduction degree (Fig.4,5) indicates that in the beginning of the process at hydrogen pressures from 100 to 400 torr the dependence of the reduction rate ( $v$ ) on the hydrogen pressure ( $p_{H_2}$ ) at constant temperature can be expressed by  $v = k \cdot p_{H_2}^{1/2}$ . This was also observed in investigations into

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# Kinetics of Reduction of Uranium Trioxide by Hydrogen

reaction kinetics of lead-, cadmium- and tin-oxides in hydrogen [Ref.13: G. Björling, Svensk.Kem.Tidskrift, 67,6-7,319 (1955)]. The apparent activation energy for this reduction stage (first horizontal part of the curves in Fig.4,5) was calculated with 20.8 kcal/mole. The second reduction stage represents a sharp decrease in reduction rate. In this step the total composition of the solid phases does not change essentially (see Tab.1). The decrease in reduction rate is apparently due to the decrease in oxygen concentration in the solid phase. It is possible that a simultaneous decrease of hydrogen adsorption occurs. Hence the total rate of reduction decreases. In the last stage of reduction the reaction rate is constant again (except the rate curve for 500°C and  $p_{H_2} = 200$  torr) and is expressed by  $v = k_1 \cdot p_{H_2}$ . At 400° and 450°C these horizontal parts of reduction curves (Fig.4) correspond to the reduction of  $UO_{2.6 \pm x}$  phase until the tetragonal phase. For this stage (70% reduction) the activation energy is 30 kcal/mole. The composition of reaction products (Tab.2) demonstrates that reduction did not proceed until formation of  $UO_2$ , only at 500°C reduction went further than  $U_4O_9$ . The reason why on the curve for 500°C (Fig.4) reduction from  $UO_3$  to  $UO_{2.47}$  occurs with

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# Kinetics of Reduction of Uranium Trioxide by Hydrogen

constant rate must be explained by additional investigations. Katz and Rabinowitch (Ref.2) stated that amorphous  $UO_3$  crystallizes when stored for a long time. In the present investigations amorphous  $UO_3$  was stored for 1.5 years and another sample was heated at  $400^\circ C$  and no crystallization was observed. Thus in the present work amorphous  $UO_3$  was reduced. Dissociation of  $UO_3$  occurs above  $430^\circ C$  [Ref.12: Biltz, W., Müller, H. Z.anorg.Chem.,163,258 (1927)], thus in the present investigations  $UO_3$  did not dissociate. The obtained results indicate that reduction of amorphous  $UO_3$  with hydrogen until formation of  $U_3O_8$  is controlled by the surface reaction between adsorbed hydrogen and the oxygen of the oxide. Adsorption occurs with sufficient high rate, reaction equilibrium is formed and the adsorption isotherm can be expressed by  $a = k' \cdot p_{H_2}^{1/2}$  ( $a$  = hydrogen concentration on the surface of the oxide,  $1/2$  means that  $H_2$  hydrogen is dissociated to atoms - according to Ref.17, F.F. Vol'kenshteyn, Usp.fiz.nauk, 50,2,257 (1956) . P.W. Jacobs, F.S. Tompkins, Chemistry of the Solid State, Bullerworth, chap.7, London (1955) (Ref.18) stated that the surface reaction is developing with a constant rate. This is in accordance with the present results, since in all cases reduction from  $UO_3$  to

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# Kinetics of Reduction of Uranium Trioxide by Hydrogen

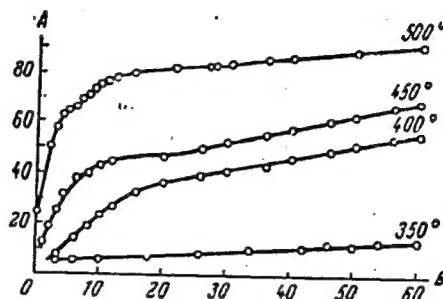
$U_3O_8$  occurred at constant rate. There are 5 figures, 2 tables, and 18 references: 9 Soviet-bloc and 9 non-Soviet-bloc.

SUBMITTED: April 7, 1960

Figure 2:

Dependence of the degree of reduction  
on time at different temperatures  
( $p_{H_2} = 200$  torr)

A - degree of reduction in %  
B - time in min (valid also  
for Fig.3)



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AUTHORS: Strekalovskiy, V.N., Vlasov, V.G.

TITLE: Reduction of  $U_3O_8$  by Hydrogen

PERIODICAL: Zhurnal Prikladnoy Khimii, 1961, Vol. 34, No. 1, pp. 38-43

TEXT: The present work is a kinetic study of the reduction of  $U_3O_8$  by hydrogen gas at  $450^{\circ}$ - $700^{\circ}$ C and hydrogen pressures of 20-400 torr. Reduction of  $U_3O_8$  in hydrogen is used in uranium technology, and for the preparation of  $UO_2$  or  $U_4O_9$ . Kinetics and mechanism of this process were studied insufficiently until now. The opinion of some American investigators (Ref.2: D. Katz and E. Rabinowitch, The Chemistry of Uranium, N.N.E.S., Div. VIII, v.5) that the reduction of  $U_3O_8$  in hydrogen occurs in two steps contradicts the modern view on the mechanism of indirect reduction of metal oxides. A recent publication by S. Anderson and J.C. Clayton [Ref.6: J.Inorg.Nuclear Chem.,7,4 (1958)] on reduction of  $U_4O_9$  is of interest, but it contains only data concerning the last stage of reduction from  $U_3O_8$  to  $UO_2$ . The present

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Reduction of  $U_3O_8$  by Hydrogen

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investigation was made in a high-vacuum-circulation apparatus (evacuated to  $10^{-4}$  torr) incorporating a recording vacuum balance. The investigated "green"  $U_3O_8$  was obtained by heating  $UO_3$  (specific surface area  $4.1 \text{ m}^2/\text{g}$ ) at  $600^\circ\text{C}$ . The rate of the reduction process was controlled by the weight decrease of the  $U_3O_8$  sample (weighing approximately  $0.25 \text{ g}$ ). All experiments were carried to complete ceasing of reduction in a time period between 2.5 to 375 min. Typical rate curves for the effect of temperature and reduction rate are given in Fig.1 and 2 [Abstracter's note: in Fig.1 erroneously 50 mm Hg is printed instead of 200, and in Fig.2 200 mm Hg instead of 50 mm Hg] while the effect of hydrogen pressure is demonstrated in Fig.3 (in the figures A = reduction rate in % reduced per min, B = total composition of the solid product of reduction, and C = degree of reduction in %). Reduction occurs with relatively constant rate at 200 torr hydrogen pressure and below  $600^\circ\text{C}$  (Fig.1). At  $600^\circ\text{C}$  and  $500^\circ\text{C}$  reduction rate is constant until solid  $UO_{2.55}$  is formed, and at  $450^\circ\text{C}$  until formation of  $UO_{2.62}$ . After this the rate decreases until  $UO_{2.45}$  is formed, then a relatively constant rate remains until the product of the composition  $UO_{2.3}$ - $UO_{2.28}$  is formed. The rate curve for  $650^\circ\text{C}$  is in the beginning somewhat different from the last-mentioned curves. Rate curves in Fig.2 start with a characteristic increase in the

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